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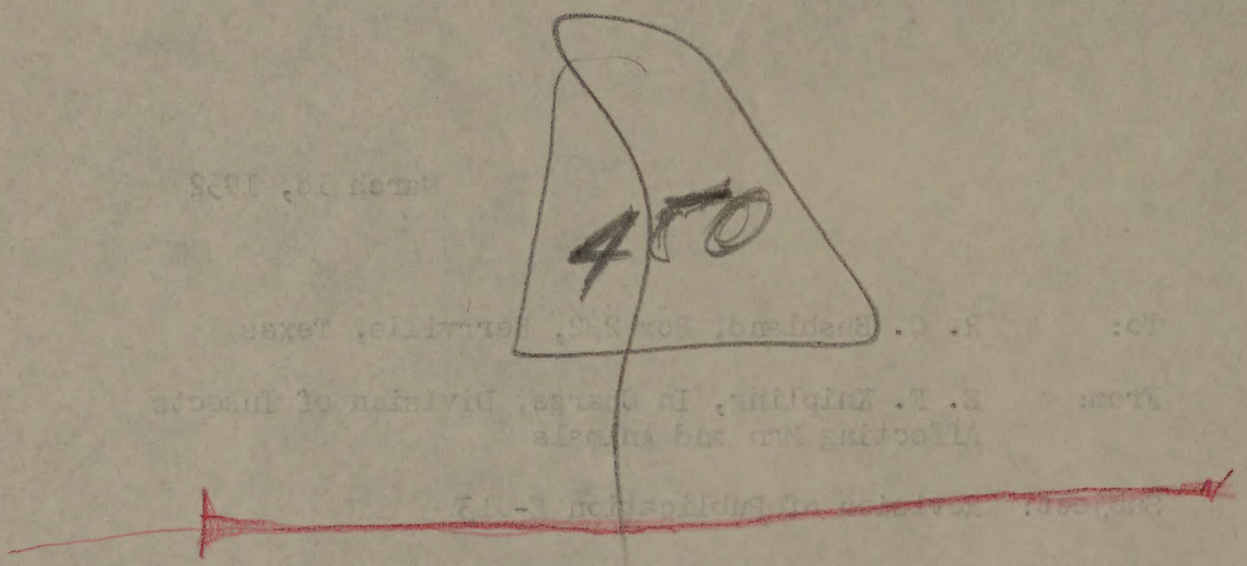
To: R. C. Bushland, Box 232, Kerrville, Texas

From: E. F. Knipling, In Charge, Division of Insects Affecting Man and Animals

Subject: Revision of Publication E-813

In view of certain changes in emulsifiers recommended for EQ 335 in E-813 publication and since we plan to curtail our work on wound treatments, it would seem well to revise this publication.

E. F. Knipling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United States Department of Agriculture
Agricultural Research Administration
Bureau of Entomology and Plant Quarantine

EQ 335 AND OTHER WOUND TREATMENTS FOR SCREW-WORM CONTROL

Prepared by the Division of Insects Affecting Man and Animals[1/]

A new smear has been developed as a wound treatment for controlling the screw-worm on livestock and fleeceworms, or wool maggots, on sheep. This new treatment, recommended as a supplement to older treatments known as smear 62 and EQ smear 82, is designated as "EQ 335 screw-worm remedy." The figure "335" represents the concentrations of the two main active ingredients, lindane (3 percent) and pine oil (35 percent).

EQ 335 does not stain, is not highly volatile, and has proved more effective in preventing screw-worm infestations than either smear 62 or EQ smear 82. Most important, however, is the fact that EQ 335 will kill screw-worm flies visiting wounds that have been treated with it.

While the EQ 335 screw-worm remedy was being developed, several other preparations containing lindane and pine oil proved satisfactory as screw-worm smears. The composition, methods of preparation, and use of two of them, and also use of a liquid formula containing these materials, are discussed briefly.

EQ 335 SCREW-WORM REMEDY

Composition and Preparation

	Percent by Weight
Lindane	3
Pine oil	35
Mineral oil	42 ± 2
Emulsifier	10 ± 2
Silica aerogel	10 ± 2

1/ This treatment was developed by Gaines W. Eddy with the assistance of W. S. McGregor, D. E. Hopkins, J. M. Dreiss, and James Cairnes. Investigations on the toxicity of lindane preparations on livestock were conducted by R. D. Radeleff and W. G. Nickerson, Bureau of Animal Industry.

A number of fractionated pine oils have been used. Satisfactory results were obtained with water-white or light-colored pine oils, specific gravity 0.92-0.94, with distillation range of 198°-225° C. Materials used in development of the preparation were obtained from the Hercules Powder Company and Newport Industries.

The mineral oil is a technical-grade white oil of 80-90 seconds Saybolt viscosity at 100° F.

The following emulsifiers have proved satisfactory: Trex 80 and Tenlo 400 (Griffin Chemical Company); Petromix #9 (L. Sonneborn Sons, Inc.); Ahcowet RS, anhydrous (Arnold Hoffman & Company); Petrobase 1, grades A, B, or C, and Petrobase 2, grades B or C (Pennsylvania Refining Company); Atlox 1045a or equal parts of Span 80 and Tween 80 (Atlas Powder Company).

The silica aerogel used in these tests is the product called Santocel C (Monsanto Chemical Company). In previous releases on the EQ-335 remedy this material was erroneously called silica gel.

The lindane may be dissolved either in the pine oil or in a mixture of the pine oil, mineral oil, and emulsifier. The use of gentle heat is recommended. The silica aerogel may be added to the lindane solution or the solution added to the silica aerogel, whichever proves the most convenient. The mixture should be stirred until a smooth smear is obtained. It is then ready for use.

Functions of the Various Ingredients

Lindane. --Lindane is the main active ingredient, being the essential larvicide and wound protector in the formula.

Pine Oil. --Pine oil is used mainly as a solvent. However, it also acts as a larvicide, and is therefore considered an active ingredient. Alone, at the concentration used, it will cause complete mortality of young (1- to 2-day) screw-worm larvae. It is irritating to screw-worms and especially fleeceworms, causing them to move about, thereby coming into more intimate contact with the lindane. Pine oil is also reputed to be a good bactericide.

Other ingredients. --Mineral oil is used as a diluent, mainly because of its freedom from irritating effects on the skin and wounds of animals. It reduces the irritating effect of the high concentration of pine oil. Silica aerogel is used as a thicking agent. An emulsifier is used so that the material will mix with the wound fluids and also with water for use against fleeceworms.

How to Apply EQ 335 to Wounds

Methods of application are similar to those recommended for smear 62 and EQ smear 82. The remedy is best applied with a 1-inch brush. Uninfested wounds caused by shear cuts, wire cuts, docking, or by any other means should be given a light coating of the material. In treating infested wounds work the material in well into and apply a coating completely around the wound, giving special attention to any deep pockets made by the worms. On sheep and goats the drainage area below the wound should also receive a light application to prevent attack by other blow flies.

Kill of Screw-Worms in Wounds

EQ 335 kills screw-worms more slowly than smear 62 or other benzene formulations. However, its action is sufficiently rapid to prevent further irritation of the wound by the worms. Larvae up to about 2 days old are immobilized within about 15 minutes, but 30 to 60 minutes may be required for full-grown larvae.

When to Re-Treat

It is recommended that wounds be treated at 7-day intervals until healed. Large or severe wounds, or those on cattle that may be bleeding profusely, may require two treatments the first week. Frequently one or two treatments will protect the wound from infestation until it is completely healed.

Kill of Flies Visiting Treated Wounds

Screw-worm flies visit wounds of animals either to feed on the exudate or to lay eggs. Practically all the flies visiting wounds during the first week after treatment with EQ 335 are killed. Since unhealed wounds should be treated weekly, a high kill of screw-worm flies should result. This in turn should reduce the number of screw-worm cases occurring in other animals during the year. Each wound regularly treated with EQ 335 is a trap for screw-worm flies.

Use Against Fleeceworms

For use against fleeceworms it is recommended that EQ 335 be diluted 1 part to 9 parts of water. For the preparation of 1 pint place 3 tablespoonfuls (about 10 teaspoonfuls) in approximately that amount of water, mix thoroughly, and then add the remainder of the water and shake well before using. Do not prepare emulsions too far in advance of their use.

Completely encircle the infestation with the material, covering an area extending about 2 or 3 inches outside the infestation. The infested area need not be sheared.

Requirements for Products Labeled "EQ 335 Screw-Worm Remedy"

The term "EQ 335 screw-worm remedy" has been recorded in the Trade Mark Division of the U.S. Patent Office to protect its use for a specific insecticidal composition useful for wound treatment of livestock to control screw-worms and fleeceworms. Products designated by this recorded term should have the composition given on page 1. General approval is given for its use for products that comply with the prescribed composition and are marketed in compliance with Federal and State regulations relating to insecticides.

The stability and shelf life of the composition have been appraised only when it was in glass containers. Until adequate tests demonstrate that other types of containers can be used without affecting the continued effectiveness of the composition, products labeled "EQ 335 screw-worm remedy" should be packaged and marketed in glass containers only.

OTHER SMEARS CONTAINING LINDANE AND PINE OIL

Laboratory and field tests have been made with numerous variations of EQ 335, and it appears that other formulas containing 3 percent of lindane and 35 percent of pine oil with a bland diluent and proper thickening agents perform about as well. However, field experiments with these other formulas were not so thorough as those required to establish the merit of EQ 335. Therefore, although they can be registered as screw-worm treatments for sale in interstate commerce, they should not be designated as EQ 335 if the other ingredients differ from those outlined on page 1.

Two formulas that cannot be labeled as EQ 335 but appear to be satisfactory screw-worm treatments are given below (figures in percent by weight).

	Formula A	Formula B
Lindane	3	3
Pine oil	35	35
Mineral oil	23	20
Emulsifier (same as for EQ 335)	10	--
Silica aerogel	4	--
Colloidal kaolin	25	--
Veegum[2/]	--	3
Triethanolamine (tech.)	--	3
Stearic acid (tech.)	--	6
Water	--	30

2/ R. T. Vanderbilt Company.

Preparation and Use of Formula A. --This formula is prepared and used esentially as described for EQ 335. The kaolin may be handled with or independently of the silica gel.

Preparation and Use of Formula B. --Dissolve lindane and stearic acid in previously mixed pine oil-mineral oil-triethanolamine by use of gentle heat. Dissolve the Veegum in water slowly with continuous agitation until a smooth texture is obtained. Combine the two solutions at approximately 65° C., with agitation, and continue to stir until cool. Directions for use are the same as for EQ 335.

Formula B can be varied. Triethanolamine stearate can be used instead of triethanolamine and stearic acid, or these materials may be used in a 2:4 instead of a 3:6 ratio. It also appears that sodium alginate (Kelgin, produced by the Kelco Company) may be used instead of Veegum.

Since the formula contains water, it should be protected from freezing. Any water-base formula is subject to separation when exposed to high or to low temperatures. Formula B can be returned to its original consistency and texture with agitation when the temperature rises above freezing.

LIQUID PREPARATIONS CONTAINING LINDANE AND PINE OIL

Some stockmen prefer a liquid screw-worm remedy to smears. Preparations containing a thickening agent usually provide a longer period of residual protection than do the liquids containing the same percentage of lindane, because more of the applied material remains in and around the wound. However, a liquid remedy may be prepared by omitting the thickening agent, silca aerogel, used in EQ 335 and increasing the percentage of mineral oil proportionally. This preparation should not be designated as an EQ 335 remedy.

The liquid treatment merely poured on or squirted into wounds sometimes fails to kill deeply pocked larvae. It should be worked into the deepest parts of an infested wound. It is suggested that labels on liquid remedies containing 3 percent of lindane and 35 percent of pine oil direct that the treatment be applied to the wound twice weekly until the wound is healed.

PRECAUTIONS IN USING SCREW-WORM PREPARATIONS CONTAINING LINDANE

1. Use the minimum amount of material necessary to treat the wound.

2. Baby calves are very susceptible to lindane. Navels or other wounds on new-born calves can be treated with complete safety if no more than 2 or 3 teaspoonfuls of EQ 335 or other lindane preparation are applied at one time. When applied once or twice a week as directed,

this quantity is adequate to destroy the larvae and protect wounds from reinfestation.

3. Avoid getting EQ 335 on the hands, and if any material should come in contact with the skin remove it as soon as possible.

CONTINUED RECOMMENDATION OF SMEARS 62 AND 82

Smear 62 was first recommended in 1941. During and immediately after World War II turkey red oil was in short supply; so EQ smear 82 was recommended as an alternate formula. The composition of those two smears is as follows (figures in percent by weight).

	Smear 62	Smear 82
Diphenylamine	35	35
Benzlene (benzol)	35	32
Turkey red oil	10	--
Triton X-300 (sodium salt of an alkylated aryl polyether sulfate)	--	2
n-Butyl alcohol	--	10
Lampblack	20	21

Should a shortage of any ingredients limit the production of EQ 335, either of these formulas may be used. For details of their preparation and use see the following publications of this Bureau:

E-540. A new remedy for the prevention and treatment of screwworm infestations of livestock. Ray Melvin, C. L. Smith, H. E. Parish, and W. L. Barrett, Jr.

E-708. rev. A new treatment for screwworms in livestock. C. S. Rude and O. H. Graham.